



## NATIONAL INTERAGENCY FIRE CENTER

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9216 NFES (FA240)

February 8, 2008

### NATIONAL FIRE EQUIPMENT SYSTEM CACHE MEMORANDUM NO. 08-2

To: NFES: National Incident Support Caches  
From: Paul Naman, NFES Representative - NIFC  
Subject: Helicopter Lead Line Retrofit

The Department of the Interior Aviation Management Safety Alert No. 05-02 identified a compatibility issue with certain helicopter lead lines and the standard 3,000 lb. cargo net. The compatibility issue is the inability of the spring gate on the lead line hook (J-hook) to close when the two links of the cargo net are inserted into the hook. See Figure 1.



Figure 1 – Lead line hook and cargo net links incompatibility.

The two rings of most cargo nets will not fit on the new smaller lead line J-hooks because the spring loaded keeper gate is too long to allow the two rings to be attached to the hook (see Figure 1). If the rings are forced onto the hook, the keeper gate can be bent or possibly broken, creating an unsafe condition by allowing one or both rings to accidentally slide off the hook during load operations.

It is recommended that corrective actions be initiated as described below to retrofit or remove from service lead lines demonstrating this problem.

There are no manufacturer's markings to identify the problem keeper gates and the only distinguishing features are that the keeper gate is riveted to the hook and is approximately 3/8 of an inch longer than the traditional keeper gate.

The San Dimas Technology and Development Center (SDTDC) investigated the extent (quantity of affected lead lines) and possible resolution options. The extent of the problem is substantial. The first resolution investigated was the replacement of the safety spring gate with a shorter length gate. Unfortunately due to the variability in manufacture of the hook and the links of the cargo net, a suitable gate length was not found.

The most practical solution is the retrofit of the affected cargo lead lines. The retrofit involves the removal of the incompatible hook and replacing it with an acceptable hook. This results in a lead line that is shorter than the standard 12 feet. Consultation with field experts indicates that a shorter lead line is not an operational concern. There is no need to separately track or identify shortened/retrofitted lead lines.

## **Identification**

To identify lead lines that have hooks requiring replacement use the following procedure:

1. Look for “China” on the side of the hook. See Figure 1. Note: Not all “China” hooks are problematic.
2. Insert two 5/8-inch links into the hook through the safety gate. See Figure 1.
3. Observe whether the gate closes over the links. See Figure 1.

If the safety gate does not close, closes by manipulating the links, or barely passes over the links, the lead line is a candidate for retrofit. Only if the safety gate easily passes over the links should it be placed back into service. Hooks where the gate barely passes over the links are identified as retrofit candidates because the links used in the examination may be on the small side of the allowed diameter tolerance for the part. Links, like the hooks, are forged parts. The manufacturing tolerance for forged commercial rigging equipment results in a fairly wide variation in diameters.

## **Consolidation**

SDTDC is not organizing or establishing a centralized retrofit program. Retrofit is the responsibility of local organizations. Field units may consider the consolidation of lead line retrofit efforts to reduce administrative costs associated with procurement.

## **Retrofit Requirements**

Appendix A is provided for application to the procurement of local retrofit programs. The retrofit involved is considered a common commercial action, and therefore should not require specialized knowledge among the field units. Commercial/industrial rigging companies in the local area should be qualified to meet the requirements of the retrofit program.

Retrofit is the alternative to scrapping current inventory and procuring new lead lines. Retrofit should only be completed if savings are attainable. SDTDC obtained an approximate 40-percent savings over replacement in the “proof-of-concept” process. This percentage is not a benchmark, but merely SDTDC’s experience. Local units must make their own determination and justify their choice. SDTDC is aware of one retrofit program where savings were in excess of 40 percent, based on a larger quantity of retrofitted lead lines.

If the original identification tag is still attached to the lead line, it should be left attached.

In addition to Appendix A, the vendor should be provided with a copy of this Cache Memorandum for the purposes of understanding the inspection/acceptance requirements.

Field Inspection and Acceptance

Field personnel should inspect the returned product for quality and assure that the contract requirements are met. Field personnel must inspect the lot for the elements shown in Table 1, the Major Criteria Inspection Table.

Inspection and acceptance of the returned product should be based on the following:

Table 1 – Major Criteria Inspection Table.

Method of Inspection	Examination	Appendix A Reference
Measure	Measure the hook to assure the dimensions are met.	1.b
Review	Review the contractor's submitted Certificate of Conformance for the ultimate load capacity of the hook.	1.a
Measure	Measure the gate release lock engagement to assure the dimension is as required. Typically this can be done by measuring the bare metal area of the gate lock.	1.c
Visual	Assure that the hook is coated for corrosion, e.g. painted, plated, etc.	1.d
Review	Review the contractor's submitted Certificate of Conformance for the rating of the thimbles as heavy duty or extra heavy.	2
Visual	Assure that the marking tag contain all of the required information.	3
Measure	Measure the character heights to assure that are as required.	3
Visual	Assure that the characters are legible and permanently stamped, embossed, cut, or etched on the metal tag.	3
Visual	Assure the tag is made of stainless or brass.	3
Visual	Assure the tag is oriented in the swage properly, a steel cable is used to hold the tag, and the loop is as required.	3
Review	Review the submitted documentation to assure the finished assembly was proof tested to 6000 lbs.	4
Measure	Measure the cable to assure that it is not less than 10 feet 2 inches.	6
Visual	Assure that the swage collar has been painted for slip indication.	7
Visual	Assure that no plastic coating was included in the swage.	7

Do not inspect every part. Use Table 2 to determine sample size and reject criteria. Count the number of parts in the lot, and based on that quantity determine the sample size. Then select a random sample of parts from the delivered lot. Each lead line from the sample is examined for the criteria in Table 1. Count the total number of defects found that violate of the requirements identified in Table 1. (Note: The same defect found on two different lead lines of the sample is considered two defects, not one defect.) Upon completing the inspection, reject the lot if the quantity of accumulated defects exceeds the number shown in Table 2 for the sample size. The vendor may resubmit a rejected lot after defects have been eliminated. Field personnel shall use the same inspection process for the resubmitted lot.

**Table 2 – Sample Size and Reject Criteria**

Number of parts (Quantity up to)	Sample Size	Reject all parts after finding more than this many major issues in the sample size
8	2	0
15	2	0
25	3	0
50	5	0
90	5	0
150	8	0
280	13	1
500	20	1
1200	32	1
3200	50	2

Example: The quantity of retrofitted lead lines is 65. According to Table 2, the sample size for inspection should be 5; 65 is greater than 50, but less than 90. From the total lot of lead lines (65) take a random sample of 5 lead lines. Inspect the parts for the parameters shown in Table 1, counting the number of defects. After inspecting all of the lead lines from the sample, if the total number of defects is greater than 0, then the entire lot of lead lines is not accepted and the vendor must rework or replace them for no additional cost.

For additional information or questions on this Cache Memorandum please contact Carl Bambarger, USDA Forest Service, San Dimas Technology & Development Center.  
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/s/ Paul E Naman

cc:

State Fire Management Officers - BLM  
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Technology Development Centers - San Dimas, Missoula  
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Logistics Center – NICC  
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Tory Henderson – USFS



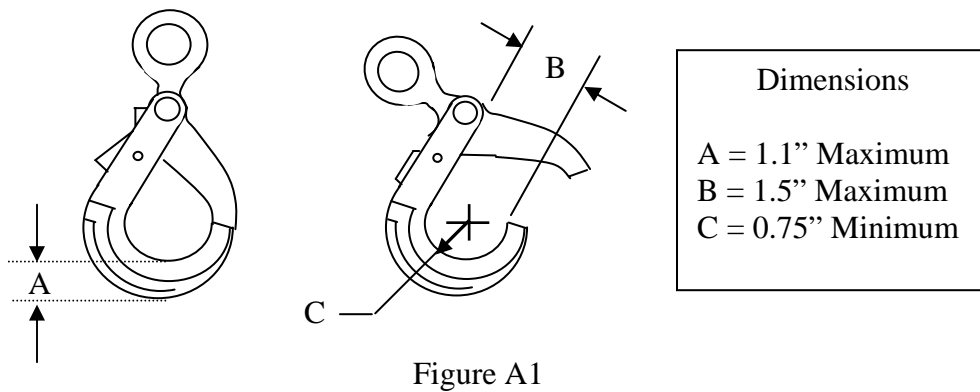
## Lead line Retrofit

Purpose: In response to Safety Alert No. 05-02, these instructions are provided. The Government has in its inventory many lead lines whose hooks are too small for use. As such, the Government is interested in the retrofit of these items. This Statement of Work (SOW) defines the requirements for this retrofit test.

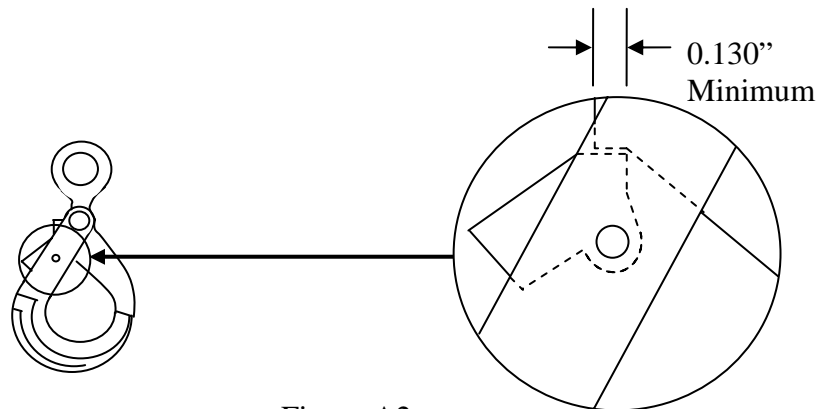
### Statement of Work

The contractor shall retrofit the supplied Government lead lines to the following requirements:

1. The contractor shall remove the existing hook and replace it with a hook that meets the following:
  - a. The hook shall have a minimum ultimate load of 11,250 lbs.
  - b. The hook shall have the dimensions shown in figure A1.



- c. A gate release shall be incorporated in the hook and have a spring return to lock the gate closed. The release lock and hook gate shall have a minimum engagement of 0.130 inches, as shown in figure A2, Gate Lock Engagement. (Note: The dashed lines in figure A2 are hidden lines.)



- d. The hook shall be treated for corrosion resistance.
  - e. The contractor shall provide a Certificate of Conformance (COC) in accordance with paragraph 5 for the hook.

2. The contractor may reuse the thimble from the removed hook end if it is in serviceable condition. The contractor may supply a new thimble if the original one is damaged or not usable. The new thimble shall be rated extra heavy or heavy duty; and shall be galvanized coated. If a replacement thimble is used, the contractor shall supply a COC for the thimble.
3. The contractor shall mark each retrofit lead line item with a tag showing the information in Figure A3. (Note: The date and company shown below in the tag information is a sample. The actual date of manufacture and proof testing shall be used.) The text size shall be a minimum 0.12 inches. The text shall be legibly and permanently stamped, embossed, cut, or etched on to metal tag. The tag shall be either stainless steel or brass. The tag shall be attached to the lead line at the hook end using a galvanized steel wire rope. The hole in the tag shall be greater than 1 and ½ hole diameters away from any edge of the tag. The securing wire rope for the tag shall be 1/16 inch galvanize steel. This wire rope shall be included in the swaging which attaches the hook. The loop formed shall be between 1 and 1-½ inches in diameter and oriented in the swage in the direction shown in figure A4.

Figure A3, Tag Information

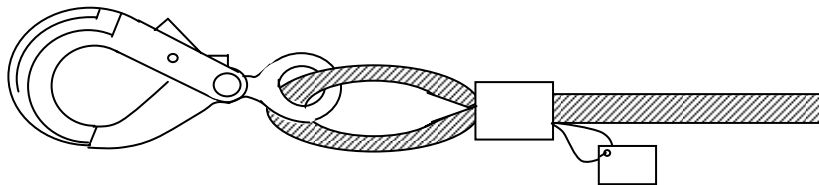
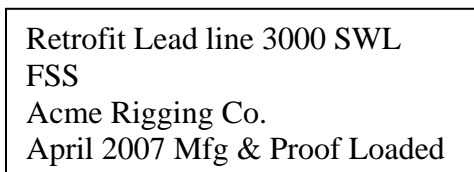


Figure A4, Tag Orientation in swage

4. Each and every lead line shall be proof tested to 6,000 lbs before delivery to the government. The contractor shall provide evidence for each applied proof test. The test equipment shall be calibrated to a recognized State or Federal standard. Calibration of the test equipment shall have occurred within the last 12 months of the proof testing. The load applied shall be a static load.
5. The contractor shall provide individual certificates of conformance for the component where required in this specification. The contractor shall provide the following information on the certificate:
  - a. Item description, i.e. eyelet hook, thimble
  - b. Item manufacturer's name, address, and telephone number
  - c. Manufacturer's item part number
  - d. Procuring document for the item (to include the quantity and date ordered)
  - e. Manufacturer's lot number, if applicable
  - f. Manufacturer's statement of safe working load and ultimate strength for the item, or part rating (applicable to thimbles only).

6. When removing the original hook from the lead line, the contractor shall ensure that the maximum length of the new lead line is achieved. The length of the lead line shall be measured from the inner load surface of each thimble while the lead line is laid out flat in a straight line. See Figure A5. The minimum length shall be 10 feet 2 inches for the retrofitted assembly.

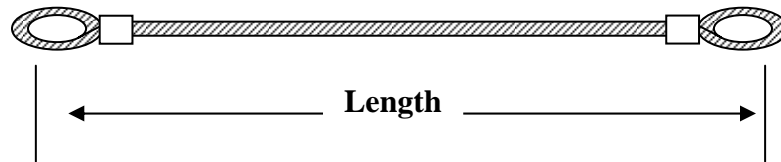


Figure A5, Note the ring and hook are removed for clarity.

7. The retrofit lead line shall be manufactured by current standard production processes to provide a clean, finished quality product. Workmanship shall be equal to the best commercial practices consistent with the highest engineering standards in the industry and shall be free from any defect that may impair serviceability or detract from the appearance of the product. The lead line shall be free of sharp edges or other that could result in injury.
8. The new hook shall be terminated in an eye using a thimble and a copper or zinc coated copper swage sleeve/collar. Aluminum swages/collars shall not be used. The wire rope shall be stripped of the plastic coating before swaging. The swaged area shall not incorporate any part of the plastic coating. All swages shall be painted for slip indication (see figure A6). The paint color shall be red. The paint shall be applied by spraying and applied in the area shown in figure 5 all around (circumferentially) the lead line. Swages shall not be covered. No splices shall be allowed in the cable. The terminated hook end of the cable shall be fully contained within their swages, i.e. the end of the wire rope shall be flush with the swage collar or extend outside the collar no more than 0.125 inches. In no case shall the end of the cable be contained within the collar, i.e. recessed inside the collar after swaging.

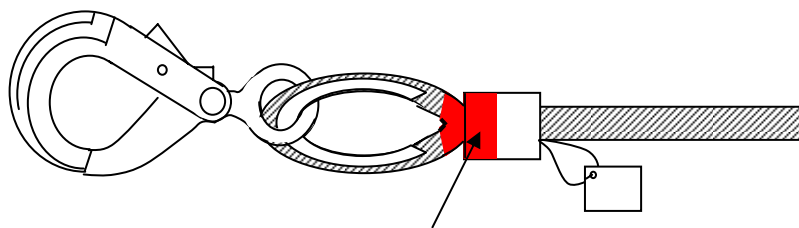


Figure A6, Slip Indicator Paint

Note to Vendors. The lead lines were procured to a specification that established the minimum tensile strength of the raw wire rope material at a minimum of 11,250 lbs. Certifications were obtained at the time of procurement validating this. Hence lead lines shall not be rejected due to doubts about the strength of the wire rope material. Lead lines may be rejected do to unacceptable wear or damage to the wire rope.

End of Statement of Work.